

PATHWAYS

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SCIENCE ACTIVITIES FOR INFANTS

by Saroja Srinivasan

Ramjas School, R K. Puram
New Delhi

While formal science lessons do not start till children are perhaps in class 3, several open-ended activities can be tried out with younger ones, in order to lay the foundation for skills needed later on.

Some of the basic skills that we plan to develop through science activities in the elementary school include :

1. Observation

- * of living and non-living things in the environment
- * of changes that take place in the environment
- * of regularity in a pattern of events
- * recognition of common shapes

2. Collecting and Classifying

- * sorting things according to some criteria—being able to recognise and notice similarities and dissimilarities in objects

3. Measurement—being able to use non-standard and standard measuring units to measure length, capacity, weight.

4. Estimation—being able to estimate length, capacity in non-standard units.

5. Developing and using a science vocabulary

6. Experimentation—being able to ask simple questions and trying to find answers through experiments.

7. Keeping a record

- * of events that take place
- * of action they have taken

8. Communicating

- * being able to use representational symbols for recording information

9. Acquiring knowledge and learning skills, e.g.

- * being able to discriminate between different materials, being aware of their properties.
- * being aware of the properties of living things and non-living things

The exercises that follow provide many opportunities for doing, observing and talking about what is observed. This conversation, obviously guided by the teacher, is a most important part of the activity, no matter how simple. It should take the form of gentle, leading questions asked by the teacher, rather than the giving

of information. Children are extremely observant and their answers are bound to provide material for more questions and further investigations. Conversation is also important as the reading capabilities of such young children are limited. New vocabulary must be introduced and repeated often, so that it is understood and internalised.

SAND PLAY

1. Feel, touch, smell and play with sand to learn about its properties.
2. Make patterns on sand. Make hand prints.
3. Fill up a container with sand. Upturn and empty it, using the container as a mould. What differences are there between dry and wet sand?

Experiment with containers of different shapes and sizes. Which container makes a bigger mould?

4. Empty sand from one container to another. How many cups are needed to fill up a small bucket? How many cups can you fill from a bowl of sand?
5. Watch sand pouring through a sieve. What remains on the sieve? How much time does it take to sieve a cup of sand?
6. Let sand fall on different surfaces. Listen to the sounds made.
7. Walk on sand without shoes.
8. Make a tunnel in the sand. Observe how the sand falls due to lack of support. What happens when you use wet sand?
9. Fill a plastic bag with sand. Feel the sand inside. Arrange the bags according to their approximate weight from heavier to lighter.

10. Shake grains of sand in a box and listen to the sound. Try with grains of different sizes.

11. Compare sand with other soils by looking at them with the help of a magnifying glass. List the similarities and differences. Is the sand dark or light in colour? What other words can be used?

12. Compare dry sand, damp sand and wet sand by handling them. Press, flatten and make impressions.

13. Where does the water go when the sand dries out?

14. Compare the drying rates of sand. How much time does wet sand take to dry? What changes occur as the sand dries?

15. The weight of different quantities of sand can be judged by hand. Terms such as: heaviest, lightest, heavier than, lighter than, the same as, could be used.

16. If a simple balance can be improvised, weigh equal amounts of damp and dry sand. Which is larger in quantity?

WATER PLAY

1. Feel water by running the fingers through it or by putting fists into it. Try to lift water in cupped hands. Play with water poking or slapping it and making waves.
2. Fill up different containers with water. See how water doesn't have a shape of its own and takes up the shape of the containers.
3. Put one cup of water in different containers. Mark the level of water in each. What do you observe? Use broomsticks to measure the height in the containers. Compare the heights.
4. Tilt the bottles and watch what happens to the water level. See how the water level

always remains horizontal (parallel to the ground).

5. Fill up containers like funnels and sieves. Does water remain in them?

6. Make water flow. Should there be differences in the levels to make it flow? Can the slope of a ground be found out by using flowing water?

7. Where can you see water drops? Think of tears, dew, drops from a leaking tap Are all the drops the same size?

Feel the drops of water. Put a drop of water on the end of one finger and bring your thumb gently up against it, what happens?

8. Can you find out ways of making drops? Try your finger, a pencil, a drinking straw or a medicine dropper.

9. Put drops of water on different surfaces—such as a wooden block, a polished table, a piece of cloth, silver paper, waxed paper etc. On which surface does water spread quickly?

10. On which surfaces do drops travel along most quickly? Have a drop race on different surfaces. What must you do to make the drop run? What is left when the drop has evaporated?

11. Which fabric soaks up water most quickly? Try with materials such as cotton, nylon, plastic, wool etc. Hang up some fabrics with their ends dipping in water to see which soaks up water faster.

12. How can water be retrieved from fabrics? Can you get back all the water? Which fabric holds back the water?

13. Note the drying effect of sun after the rain. Where does the water go?

14. Wet three handkerchiefs. Dry them under different conditions and see which dries up faster?

15. Put a variety of things in water and see which of them dissolve.

16. Put sand in water. Let it settle and then decant. Try with garden soil.

17. Put different things in water to see which of them float and which sink. Does it make a difference how you put the object in water? Try with a blade, with flattened silver foil and the same foil crumpled up.

18. Drop a small object in water and watch the ripples. From where do they start? What happens when the ripples touch the edge of the bowl?

19. Estimate how many cups will be needed to fill a jar, a bucket. Find out if your guesses were correct.

STONES AND SOIL

Activities with a collection of stones.

1. Arrange the stones according to their size—biggest to smallest. Arrange in order of their heaviness—heaviest to the lightest. Some times a smaller stone could be heavier than a bigger stone. So watch out.

2. Sort them in two groups according to their shape, size, colour or texture. (wash them with water to bring out their real colours).

3. Play a game with a partner. Sort some of your stones into groups according to some criteria. Can your partner find out how you have sorted them?

4. Pick up interesting stones from the school ground. Talk about the stone you have picked up. Describe its size, colour, texture.

5. Pick up samples of soil from areas around the school. Feel their textures. Observe them through a lens. Can you see different particles in them?

6. Put the samples of soil in water and let them stand. Watch how it settles down. Do you observe anything about the size of the

particles that settle down as the bottom most layer?

7. Make impressions with your shoe on different types of ground. Wet the soil and make the impressions again. What happens to it as the soil dries up?
8. Walk barefoot on different types of ground—sand, grass, rough ground, paved area etc. Feel the differences. Can you identify these surfaces blindfolded?
9. Try to dig up soil from various areas of the school ground. Which place is the easiest to dig? hardest?
10. Pull out a grass plant from moist soil. Is it easy to pull it out? Observe how the soil is sticking to the roots.
11. Make mud piles with different kinds of soil. Get some clay and make many kinds of things with it. Can you make these with sand?
12. Pour water on soil and see how the water disappears through the ground. Pour water on paved ground and see the difference.
13. Pour cups of water in sand. Dig up the sand to see the water again. Can you do the same thing with garden soil?
14. Sow some seeds in the soil. Water them everyday and watch the seeds sprouting.
15. Watch ants disappearing into holes in the soil. Where do they go? They have their homes under the ground.
16. Watch the earthworms come out of the soil after a heavy rain. Look out for the casts of earthworms on the ground.

LEAVES

Collect leaves of different kinds from the

garden. Take those lying on the ground if possible. Take care not to pluck more than one or two leaves of each kind and avoid damaging the plants or trees.

1. Feel the texture of the leaves. Arrange them according to their textures.
2. Observe the shapes of the leaves. Sort them according to their shapes.
3. Arrange them according to their size—biggest to smallest leaf.
4. Arrange them according to their colour—darkest to lightest.
5. Make leaf rubbings by rubbing a crayon over a piece of paper placed on the underside of the leaf.
6. Colour the underside of the leaf with wet colours and press them on a paper to get leaf prints.
7. Place the leaf on a paper and draw its outline. Colour it the same colour as the leaf.
8. Play a game with your partner. Sort your leaves into two groups according to some criteria. Can your partner find out what this is?
9. Observe some new leaves and some old ones. What differences do you see? Can you identify new leaves and old ones by their colour?
10. Arrange the leaves and form a design.
11. Observe twigs to see if there are two leaves at the same place. Learn new words to describe them—pair, opposite each other, on both sides etc.
12. Crush the leaves to see if any of them has any characteristic smell.

An Environment Awareness Programme

The nineteen seventies brought an increased awareness among both policy makers and the public of the possible unwelcome side effects arising out of gross neglect of Nature in a blind race for modernization. Though development remains of the highest priority, efforts must be made to reconcile it with Nature. Development and conservation must go hand in hand if we want to avoid disaster.

At a time when our country is undertaking rapid development programmes, it was considered extremely important by some interested, enthusiastic and informed staff members that the future citizens of the country must have a primary knowledge of environmental issues and greater understanding of our total dependence on Nature.

In 1982/83 we started the programme in earnest. It has been going on for the past four years. The first task was to select the leaders for steering such a project. One interested teacher took on the task. This teacher was aided by all members of the staff as the idea caught their imagination. In terms of ideas, material, information and assistances, it became at first an awareness project for the staff.

We envisaged a programme involving some students of class XI (16 yrs) and all the students of class VII (12/13 yrs). Twenty of the senior students are members of the Environment or Nature Club. They meet fortnightly in workshops organised by the teacher who works in an advisory capacity with the group. Here is where they identify issues, design programmes and plan activities, and these are extended to the students of class VII through them. This is done during regular periods, provided in the time table. The junior students are divided in groups of 6 or 7 with a one permanent leader from class XI. The activities are informational

and participatory. Different methods are used to achieve the aims—film, slide shows, games, talks, group discussion, group activities, interviews, skits, roleplays, excursions and outings are some of these.

To carry out this programme we get a lot of support and assistance from several prominent agencies of the city. Foremost among these are the World Wildlife Fund, the Environment Services Group, the National Museum of Natural History, Kalpvriksh, Ankur, N.C.E.R.T. and the U.N. Agencies.

We plan out year-long programmes. These are reviewed at the end of the year and a new programme is chalked out for the next year based on this review. We keep the general outlines and basic inputs in all related areas, as a basic constant but every year there is a new theme or topic. One year, the theme was "Trees and Birds". The importance of trees in our life—their different uses, commercial, medicinal, climatic changes, their functions in the design of nature, the importance of different trees, leaves, plants, fruits in our religious practices and why? (eg. *Tulsi* or Coconut).

- Deforestation, afforestation, land erosion and its effects on animal life.
- Tree identification campaign (within the school campus and at India Gate Lawns).
- Slide show on trees by Kalpvriksh.
- Talk and debates on Asiatic.
- Kind of trees being planted in the capital
- Area charts of one's own locality depicting various kinds of trees.
- Trip to Delhi Zoo and the ridge.
- A project on Migratory birds was the special feature of the year. There was an introductory talk by an expert on the topic. It was followed by a slide show. The following weekend a trip to Ghana bird

sanctuary was organised. The glorious moment came when a wonderful exhibition on migratory birds was organised to complete the project. The exhibition had photographs, bird migration routes, location of sanctuaries on the maps, and information on their food habits, habitats, pattern of flying. The entire exhibition was prepared by the students in a two-day workshop. Their enthusiasm, co-operation and energy to work was a learning experience for the teachers.

Such themes as ecological balance, the Silent Valley project, wild-life—its importance, conservation of non renewable resources, the Bhopal tragedy, and waste disposal have been focal points in last few years and have been dealt with as thoroughly as the first years, programme.

At the end of the year a final evaluation of the students is also done in an informal manner. In terms of inter-section or inter-group competitions, there can be presentations in the form of skits, plays, a quiz, interviews. This makes for an interesting and informative experience for the audience and brings commitment among the participants.

All through the year, soft boards are maintained in the class room on the subject. Newspapers, Magazines, Television Programmes, are discussed in great detail by the students.

Jayshree Oza
Bharatiya Vidya Bhavan's
Mehta Vidyalaya
New Delhi

Two Language Games For Children

I. Ask the Right Question

You need a set of cards, between 30 and 50 in number, which you can make quickly yourself; each card has a word or phrase written on it—see the examples below. Put the cards face down on the table. In pairs, take turns picking a card but don't show it to your partner. You have to try to make your partner say what is on the card, by explaining, defining, asking questions and so on.

Eg. A. If you travel somewhere you need this

B. A ticket

A— No, it is something you carry.

B— A bag.

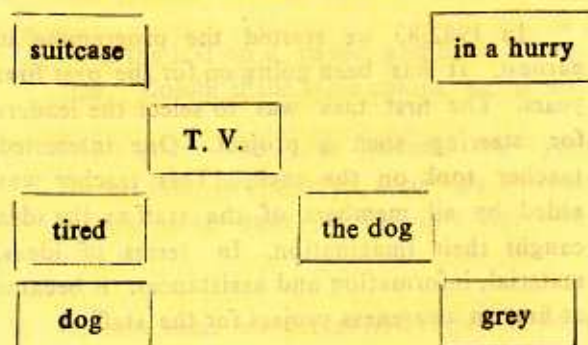
A : Nearly. What do you put your clothes in ?

B : A suitcase

A : That's right. (A then gives the card to B)

The game can be made more difficult by putting in longer phrases

Eg. in the suitcase, turn the T. V. off, the man who was walking etc.



II. Conversation Game Kits

The teacher sets a situation, eg—in a restaurant, or meeting a friend in the street or visiting a friend in hospital. The teacher may also give the first line of a conversation like "I went to a party last night". The aim of each team is to keep the conversation going by thinking of appropriate questions to ask every time there is a silence. If there is a silence of more than a set time, e.g. 5 or 10 seconds, the team is out. The teacher needs to time each team's performance.

by Kalyani G. Kumar
Bhavan's Public School
Jubilee Hills, Hyderabad

TIN-CAN EXPERIMENTS—III

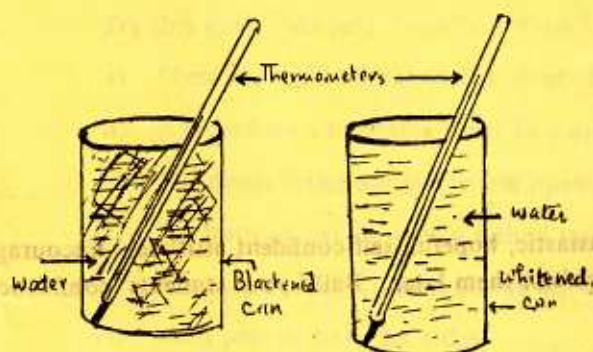
Dr. Lalit Kishore

Principal, Navodaya Vidyalaya

Khunga Kothi, Haryana-126102

I. BLACK BODIES ARE GOOD ABSORBERS OF HEAT

Take two identical tin cans. Paint one of them white and the other black. Pour equal volumes of water into each of them. Place a thermometer in each of the cans. Put the cans in the sun and note down the temperature of water in each of the cans after every five minutes.



Record your observations in a table of this kind.

Time	Temperature of water in the black can	Temperature of water in the white can
0 min		
5 min		
10 min		

Plot the graphs of the time versus the temperature of water in the two cans. What is the nature of the graph in each case? In which can does water show more rise in temperature? What do you conclude from the experiment?

2. BLACK BODIES ARE GOOD RADIATORS OF HEAT

Take the two identical tin cans of the previous experiment. Pour equal volumes of hot

water in each of them. Place a thermometer in each of the cans. Allow the water to cool and note down the temperature of water after every two minutes. Record your observations in a table of this kind.

Time	Temperature of water in the black can	Temperature of water in the white can
0 min		
2 min		
4 min		
6 min		

Plot the graphs of the time versus the temperature of water in the cans. What is the nature of the graph in each case? In which can does the temperature of the water fall more? What do you conclude from the experiment?

3. A BAROMETER

Take a tin can and cover its mouth with a tightly stretched balloon. Take a straw and put a drawing pin into one end. Suspend the straw from a stand using a thread tied slightly away from the drawing pin. The drawing pin end of the straw should rest on the balloon membrane. This can be done by adjusting the position of the stand.

Place a scale behind the other end of the straw. Note the position of the straw on the scale at various hours of the day. Record your observations in the table.

—Contd. on page 17

ENCOURAGING CREATIVITY IN CHILDREN

THE DEVELOPMENT OF PROGRAMMES FOR ACADEMICALLY GIFTED AND TELENATED CHILDREN IN THE MIDDLE SCHOOL—III

by Gayatri Moorthy

"To be extremely intelligent is not the same as to be gifted in creative work. Students with high intelligence are not necessarily the ones with the most original ideas. The Quiz Kids are often referred to as geniuses. They would undoubtedly score high in memory functions..... But it is doubtful whether they are also fluent in producing ideas"

— Dr. J. L. Thurstone

Factors that Tend to Cramp Creativity

- * self-discouragement
- * the fear of looking foolish
- * being judgemental
- * perfectionism
- * timidity

Creative thinking calls for a positive, enthusiastic, hopeful, self-confident attitude. Encourage students to produce creative new ideas first and judge/test them later. Build your students' confidence in their ability to tackle and solve problems.

Ways In Which Creativity Can Be Developed

Creative gifts can shrivel through disuse or they can be built by up taking on those activities which stimulate and exercise the imagination. Some possible ways are :

- * first hand experiences
- * playing games
- * solving puzzles
- * hobbies and fine arts
- * reading
- * writing
- * brainstorming
- * observation and sharpening one's senses
- * asking questions

and some other techniques which follow.

THERE'S MORE THAN ONE WAY TO THINK

Gifted students seem to have the knack of thinking "differently"; perhaps finding solutions instinctively rather than through logical, sequential steps. Here are some exercises designed to help such students sharpen their skills. However don't forget that they might also be used to activate latent talents in other students too - those that you did not categorise as "gifted".

I. SHARPEN YOUR OBSERVATIONAL SKILLS

1. How Well Do You Know Yourself ?

Without looking or stopping to think, answer these :

- i) When you put on your slippers (shoes), which one do you put on first ? Guess first and then try it out. Better still, check up tomorrow morning.
- ii) When you fold your arms across your body (WAIT - don't do it yet), one hand is on top and the other is tucked in. Do you know which is which ? Guess. Were you correct ?
- iii) What happens when you clasp your hands ? Which thumb is on top ?
- iv) Do you listen to the telephone with your right ear or your left ear ?
- v) If you thread a needle in which hand do you hold it ?

2. Look At What You Usually See

Try this quiz. Answer "true" or "false". See how you score.

- i) There are eight blocks in the inner circle of Connaught Place, labelled from A to H.
- ii) A record on a turntable turns in a clockwise direction.
- iii) The doors into your classroom open inwards.
- iv) The buttonholes on a man's shirt point up and down.
- v) In a lady's cardigan the buttons are attached on the right.
- vi) Most pencils have six sides.
- vii) There are a hundred matches in a box.
- viii) Page 52 of a book is a right hand page.

Which ones were you absolutely sure about ? Which ones did you guess ? Wait a few days or a week, and try the quiz again. See which information you kept stored in your head. **Keeping details in your head isn't always a good idea. Learning to look is. Noticing things is a good exercise: you begin to see things you've largely ignored.**

3. Looking And Remembering

A. Can you visualise the kitchen in your home ? Can you remember all the things that are on the various shelves ? How many are there of each ? In what order are they placed ? When you go home, check up how much your mind's eye has remembered.

B. Before you go out, see how many of these questions you can answer.

- i. On traffic lights, which colour is at the bottom?
- ii. Is there a public telephone near your house? On which side of the dial is the coin slot?
- iii. How many street lights are there on your street?
- iv. Can you name a tree/shrub that is flowering now?
- v. Is there any house in your square (block) which does not have a TV aerial?
- vi. Do the numbers of houses on your street go by twos?

4. Sharpen Your Senses

To observe, you need to use all your senses. Play games with a partner to see if you can identify when blindfolded

- * things which can be distinguished by their smell—try leaves, flowers, gum, soap, vegetables, fruit.
- * things which can be distinguished by your sense of touch—feel paper, cloth of many kinds, common objects.
- * common things which you eat and can identify by their taste. Try this exercise with a clip on your nose. Smell and taste are closely linked together.
- * things which can be identified by the noise they make—riffling the pages of a book, tearing paper, turning switches on and off etc.

II. DEVELOPING YOUR IMAGINATION HELPS YOU USE YOUR SENSES BETTER.

Try these activities.

5. Imagine

- * the taste of peanuts—the salty flavour, the slight oiliness, the satisfying feel as they get crushed beneath your teeth, the temptation to reach for one more..... and another.....and another.....
- * the feel of biting into a crisp, juicy, somewhat tart apple... ..
- * The smell of *dosas/parathas* being fried.
- * the smell and taste of toothpaste
- * the smell of spirit/disinfectant in the doctor's clinic
- * the sound of a dropped book hitting the floor.

When people need to concentrate on something special they sometimes close their eyes..... or stare off into space. Sensory overload or feeding too much into your brain at one time reduces concentration. What do you do to concentrate? Do you need absolute silence? Do you need to have a transistor playing softly while you think? Do you need to sit in the sun and stare at nothing in particular? Do you need to exercise vigorously? Or do you like to snuggle into bed and think? Explore and find out what helps you think.

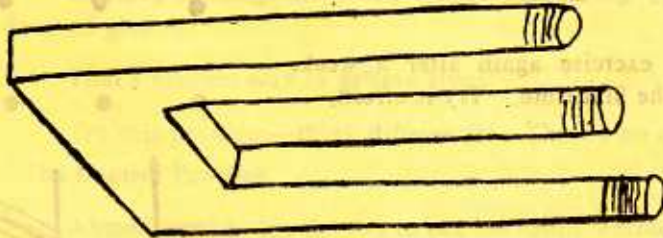
6. Let's work a little more on stimulating a child's imagination.

- Put a blob of ink on a piece of paper and blot it quickly. Make a list of the objects the resultant smear resembles.
- Renu looked out of the classroom window at the clouds in the sky. She and her friends wrote down what they were reminded of: mounds of fluffy white cotton wool; soft cushions to break a fall; castles towering in the air. What other similes can you think of?
- Play a game. Look out of the window and describe what you see—not in literal terms, but rather by a process of association. To start off:

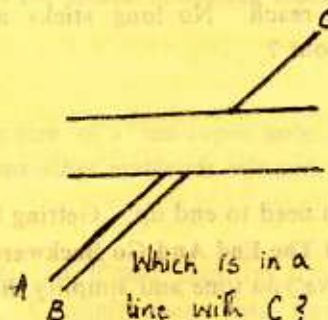
- The tall grey building reminds me of
- the (rough) tough patchy skin of a crocodile marked out in squares
 - a chequered board on which a game can be played

III. LOOKING AT THINGS DIFFERENTLY

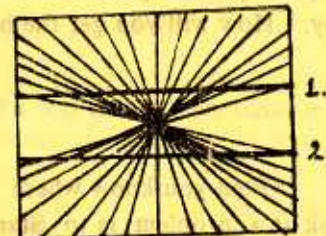
Don't always believe what you see at first glance. When you look at something carefully you can often see something different. Here are some examples:



Is the hat
taller or wider?



Which is in a
line with C?



Are the lines 1 & 2
curved?

The next step is to get your brain to serve you that way when there's no optical puzzle. Practice thinking deliberately about the same thing in more than one way.



- Is the glass half empty.....or half full?
- Is the girl lifting the box up.....or putting it down?
- What is the girl doing?

Have you observed a tonga horse closely? It usually wears 'blinders' over its eyes. These shut off its peripheral vision. It can only see things in front and will not get distracted or nervous. Sometimes we wear mental blinders. We build walls around our brains which prevent us from looking at things in different ways. Here are some exercises to help you look at problems in different ways.

7. The Nine Dot Puzzle

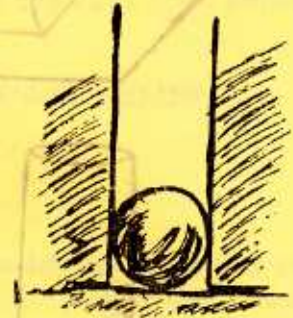
There are nine dots in the figure. Without lifting your pencil, draw through all the nine dots using only four straight lines.

Hint: Don't box yourself in! Try this exercise again after a week. Don't strain to "remember" how you did it the first time. Try it afresh.



8. Play Ping-Pong

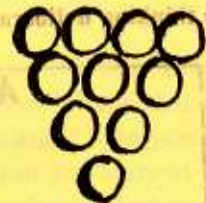
There's a table-tennis (ping-pong) ball inside the hole. The hole is just a little bit wider than the ball, and a little deeper than you (or anyone in your class) can reach. No long sticks are available nearby. How will you get the ball out?



Often you know where you need to end up. Getting there is the problem. One of the ways to look at a problem is to **Start At The End And Go Backwards**. What do you do when you try to solve a maze problem? It might save you time and simplify the problem.

9. The Ten Coins Problem

Take ten identical coins and arrange them like this. By moving only three coins, you must make the arrangement point in the opposite direction. Draw it separately and compare the two arrangements—how are they similar? Different? You know where you have to end up. Did working backwards help?



10. The Two Jug Problem

Suppose you are given these two jugs and an empty basin. You are required to pour exactly four litres into the basin. How will you do it? Don't start pouring - that way you'll waste a lot of water! Picture your end point and work backwards - there's more than one solution.



11. The Six Glasses Problem

Draw six identical glasses. Label them A,B,F. There is water in glasses A, B and C. D, E and F empty. If you are allowed to touch and move only one glass, how would you change the line so that the glasses are alternately full and empty? If it helps, you could draw the final line-up below the first line of glasses.

Did you take off your mental blinders?

Looking at things differently means not making up your mind too soon Don't say, "It can't be done—I give up:"

That's another way of getting stuck!

Try this problem—think differently!—There's no catch.

12. The Dentist Problem

Ahmed went to the dentist to get his tooth extracted. Ahmed was the dentist's son, but the dentist was not his father. How can this be?

Sometimes a preconceived idea is the mental stumbling block that prevents you from looking at a problem differently.

13. The Coin And The Paper

Get a piece of paper, about the size of a ten-rupee note, and a 50p coin. Now balance the coin on the thin edge of the paper.....no other materials allowed.

14. Blowing Bits of Paper

You could do this in your head, but if you must try it out, tear off five small bits of paper from the piece you used in exercise 13. Crumple them into tiny pieces and place them on your palm at five points, well-separated from each other.

Now you have five pieces of paper on your palm. You have to blow them off.....but one at a time. How will you do it?

15. A Sheet of Newspaper Between Friends

How can two people stand face to face on a single sheet of newspaper so that they cannot possibly touch each other? (You can't tie up their hands!)

16. Look at simple everyday things in a new way—e.g. a knife, a pencil, a screwdriver. Observe them carefully. Note different forms of the same item.

A. A Knife

1. Name the two most important part of a knife
2. Make a list of the different kinds of knives
3. What is the knife that you use to cut grass?
4. What is the knife that you use to cut a man's beard?
5. What is the knife that folds up.
6. Name two knives that move together.
7. What were the first knives made from?

8. Which was the big knife carried by knights in armour?
9. Name three food items that you can cut with a table knife.
10. Write down words you can find on a knife.
11. Shell, coconut, wire, stick—which makes the best knife?
12. To cut a pizza into six pieces—what is the smallest number of cuts needed?

B. A Pencil

1. How many sides?
2. Name every material found in a pencil
3. Why is there a wooden part of a pencil?
4. How does lead get inside a pencil?
5. Name 3 things a pencil could be used for, besides writing.
6. How could you make a pencil on the table rise in the air?
7. Where do the pencil marks go when you erase?
8. What is happening when the pencil makes a mark?
9. Examine the words on a pencil.
10. How is the pencil like a tree, a lipstick?

Did you know: An average pencil about 18 cm long, can draw a line over 50 km long?

- C. Look at a simple screw-driver (metal blade—wooden handle). Jot down all the ways in which screw-drivers have been improved to make them more effective instruments. Suggest three further improvements.

IV. SOLVING PROBLEMS MEANS ASKING QUESTIONS

Obviously you must ask yourself several questions like these :

- * What don't I know about the situation ?
- * What do I know about it ?
- * What more do I need to know ?

17. Ask Yourself Questions

and try to solve each of these riddle stories.

- i) A man went for a walk. It started to rain. He didn't have a hat. He wasn't carrying an umbrella. He kept walking. His shoes got wet. His clothes got wet. Still his hair didn't get wet. How ?
- ii) A woman took a spoonful of sugar. She put it into her Nescafe. The sugar didn't get wet. How ?
- iii) Rohan, Anita, Pyari and Ramu live in the same house. One night Rohan and Anita went out to the cinema. When they got back they found Pyari lying dead on the floor. Ramu was not arrested. He was not questioned for any crime. Why not ?
(You may find more than one possible solution to this one)

V. MAKING LISTS

Making Lists is another way to tackle problems. Usually people make lists to help them remember things that have to get done - shopping, chores, homework etc.

Lists can make you think, if you :

- * look at things in different ways
- * look at things in more ways.

Use your memory to make up lots of lists like these :

- * list all the foods you can think of that are yellow.
- * list all the games you know that are for two people.
- * list all the things that 'bug' you.

Next try making lists of what you can do with what you already know. Try to :

- * list all the uses that can be made of an empty tin can.
- * list all the uses you can think of for an umbrella.
- * list all the ways in which you could improve your home.

Find a cartoon or a funny picture. Remove the captions. List all the things that might be happening there. Watch out for any preconceived ideas. Think up some really wild, funny ideas to fit the action in the pictures.

VI. HAVE YOU SEEN SOMETHING LIKE THIS BEFORE ?

Comparing a problem to one you have already solved or can solve more easily is one way to work. Try this one.

18. A boy's grandfather is only six years older than the boy's father. Can you explain this ?

VII. HAVE FUN

Problem solving can be serious, but if you look at thinking as a serious business, you may be missing an important idea. Sometimes letting your mind play is a good idea - even being silly ! Good jokes and riddles are funny and they need clever people to think of them. The punch line is totally unexpected and that's why it makes us laugh. Often jokes and riddles connect things you never thought of as connectable.

Have you heard this one ?

An old man sat on the bench on the railway platform. After a while he got up and slowly hobbled up to the enquiry clerk and asked, "At what time does the north-bound train pass through ?"

"Ten minutes from now Sir", was the reply.

The old man thanked the clerk, carefully found his way back to the bench and sat down.

Fifteen minutes later, he made his way to the same clerk to enquire about the south-bound train.

"In another twenty minutes, Sir".

The old man resumed his seat.

He returned again after the train went through, to ask about the east-bound train.

When that too had gone through the station, his next question was about the west-bound train. Intrigued the clerk said, "Just where do you want to go Sir ?"

The old man replied indignantly, 'Me ? I'm not going anywhere Son !' I'm just. . . ."

Can you guess what the old man's next words were ?

19. Think A Link

Now try your hand at connecting the unconnectable. The words in the groups below don't seem to have much to do with each other. You try to think of links, perhaps more than one, and tell us about it.

pencil
flower
basket
tree

apple
lamp
stapler
telephone

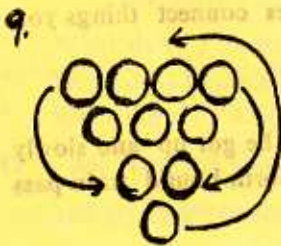
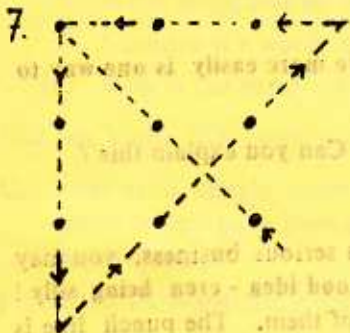
football
lemon
clay
clock

Share your "links", compare them with friends. Remember there are no "correct" answers. You might even come up with a joke or a funny riddle.

The Last Word

For those readers who need solutions to these problems, here they are.

2. i. False ii. True iv. True v. False vi. True vii. False viii. False



8. Pour water into the hole and the ball will float up.

10. Here is one way. Find some others.

i) Fill the 5l jug (A) and pour out 3l into the smaller jug (B)

ii) Throw away the 3l of water.

iii) Pour remaining 2l of water into B.

iv) Fill the 5l jug (A) once more and from it, top up jug B again. It will need 1l more, and there will be 4l left in A to be poured into the basin.

11. Pour the water in glass B into glass E. Put B back in its place.

12. The dentist was Ahmed's mother.

13. Fold the paper in two length-wise and fold again concertina-fashion. Place on a table and rest coin on the edge.

14. Close your fingers over your palm and blow off the bits of paper, one at a time.

15. Slip the newspaper under a closed door and let the two persons stand on either side of the door

17 i) The man had no hair.

ii) She put the sugar into dry Nescafe Powder,

iii) One possibility—Pyari was a fish, Ramu was a puppy. What others did you think of?

18. It was the boy's maternal grandfather.

Have Fun : "I'm just waiting to cross the track."

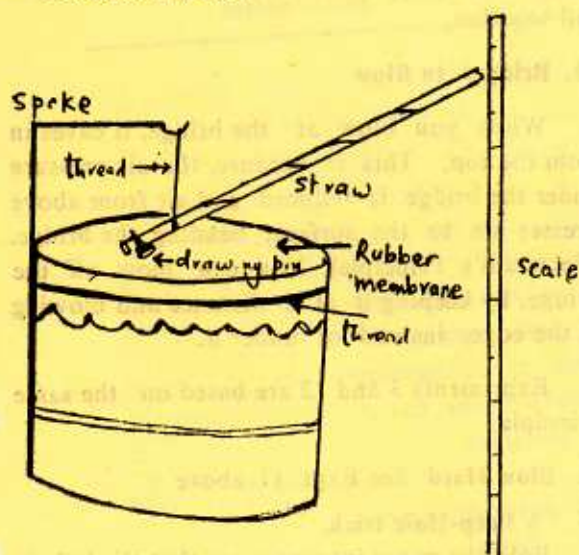
Please see page 17 also

The things which the child loves remain in the domain of the heart until old age. The most beautiful thing in life is that our souls remain hovering over the places where we once enjoyed ourselves. —Khalil Gibran

Education is going forward from cock-sure ignorance to thoughtful uncertainty. —Tolstoy

The more you practise what you know the more you know what you practise. —Unknown

—Contd. from page 7



Day=

Hour Position of the straw

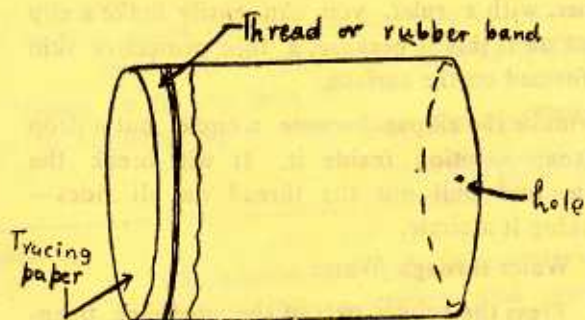
7 a.m.
8 a.m.
9 a.m.
10 a.m.
11 a.m.
12 noon etc.

How does the position of the straw vary during the day? How can you account for the

change in the position of the straw? Repeat the experiment for a number of days and compare the observations?

4. A PINHOLE CAMERA

Take a can open at one end. Blacken its interior. Stick a piece of tracing paper (butter paper) over its mouth. On the other side of the can make a tiny pin hole. Stand in a room and look at the view outside as seen on the tracing paper. What is the nature of the image on the tracing paper? Move away from the object. What happens to the size of the image? Make the hole bigger. What happens to the image now? Make five small holes near the centre. How many images do you see now? Place a convex lens in front of the holes. What happens to the images now?



Solutions to Science Experiments Suggested in the April 1987 Issue of Pathways

1. Balloons that don't Pop

Apply a small length of Scotch tape on the balloon and then prick it. The balloon will not pop because the tape prevents the balloon from contracting to push the air out.

2. The Stubborn Cork

Add water, drop by drop, along the edge of the glass and the cork will gradually shift into the centre.

3. The Can't with Cans : See Expt-11

4. Fireworks

A fuse (like magnesium wire) is used to ignite the steel wool. If the steel wool is tightly compressed it does not trap enough oxygen (air) to help it to burn. Hence it should be opened up and hung up in a place where the supply of air is plentiful. Then, if the magnesium fuse is lit, the steel wool burns.

5. A Steam Engine in the Laboratory

Wait for steam to come out of the spout; plug the spout with the potato. Place on the mouth, a water-filled balloon, just big enough to sit on the mouth of the kettle.

When the water starts boiling, the balloon will start puffing up and down like a steam engine.

6. Boiling water with an Ice Cube

When the flame is removed, the water stops boiling after a few seconds. When the ice cube is rubbed on the flask, it reduces the temperature, there by increasing the pressure for a few seconds; the water will start to boil again. To prevent bursting, remove the cork, after a few seconds.

7. Feats with Water

If the water is filled to the brim, and if you gently smoothen the surface from one end to the other, with a ruler, you can easily make a clip float on it this is because, a thin protective skin is formed on the surface.

To make the ellipse become a circle, put a drop of soap solution inside it. It will break the skin, and pull out the thread on all sides—making it a circle.

8. Water through Water

Press the rubber part of the medicine dropper to push out all the air. Lower it into the trough carefully pressing onto the rubber. Insert the bent part into the top portion of the glass filled with air and let go the rubber.

Air from the glass, will go into the tube and water will rise taking its place. Continue this several times, until the glass is filled with water.

9. Magic Spool

Lift the thread so that it makes an angle with the horizontal, and pull gently. The spool will roll back.

10. An Air Race

The card and ball when dropped separately, fall separately. The ball meets less air resistance and falls faster. When the ball is placed on the

card the two fall together. Can the students suggest reasons? Two balls of different sizes fall together,

11. Bridges to Blow

When you blow at the bridge, it caves in from the top. This is because, the air pressure under the bridge is reduced and air from above presses on to the surface, bending the bridge. (Bernoulli's Principle) You can blow off the bridge, by keeping it at a distance and blowing at the edge, instead of under it.

Experiments 3 and 12 are based on the same principle.

12. Blow Hard See Expt. 11 above

13. A Peep-Hole trick

Fold the paper into two so that the hole is also folded equally. Place the coin inside the fold on the hole.

Slightly bend the paper at the edges to elongate the hole. The coin will drop out, since the circle becomes an ellipse, increasing the horizontal diameter.

14. Melting Ice

Since ice has a greater volume than the water that it is made up of, water will not overflow when the ice melts.

15. Find the Guilty finger

Each person's fingerprints are different from others. Each fingerprint is itself different from the prints of other fingers. By comparing and eliminating, one can arrive at the correct answer.

Note : It is more important for the children to "experience" these Science ideas, than for them to learn the precise principles on which they are based. Allow the students to try and work out "how to do it" on their own, as far as possible. Thereafter explanations of "why it works" must be kept simple, and preceded by discussions which allow students to express their opinions on the matter. □